Claims:

1. Method for producing ethanol and methane from biomass, comprising:

   a) enzymatically liquefying and saccharifying flour of a biomass with a particle size of less than 1 mm in a conventional manner in the presence of water, thereby obtaining a mash;

   b) fermenting and distilling the substrate in a conventional manner, thereby obtaining ethanol and a pulp;

   c) separating the pulp into a solid phase and a clear phase, wherein a clear phase with a content of solids of less than 1% is obtained;

   d) obtaining methane from the clear phase in a methane reactor.

2. Method according to claim 1, comprising milling biomass to a particle size of less than 1 mm, thereby producing flour.

3. Method according to any of the preceding claims, wherein hull components are substantially separated from the flour prior to step a, or separated from the mash prior to step b.

4. Method according to any of the preceding claims, wherein the biomass is grain.

5. Method according to any of the preceding claims, wherein grain, in particular wheat, rye, maize or triticales is used as biomass, and the bran is separated after milling.

6. Method according to any of the preceding claims, wherein the particle size of the flour is less than 0,6 mm.

7. Method according to any of the preceding claims, wherein proteins present in the biomass are substantially separated from the flour prior to step a or separated from the mash prior to step b or separated from the clear phase of the pulp in step c.

8. Method according to claim 7, wherein the separation of the proteins prior to step b comprises precipitation by cooling and separation of the precipitate.

9. Method according to claim 7, wherein the separation of the proteins in step c comprises precipitation by cooling and separation of the precipitate.

10. Method according to claim 9, wherein yeast, fibres, solid substances, fat and/or proteins present in the pulp are agglomerated by cooling and sedimented prior to separation of the pulp into solid phase and clear phase.

11. Method for producing ethanol und methane from grain, comprising

a) milling the grain to a particle size of less than 1 mm and separating the bran from the flour;

b) enzymatically liquefying and sacchariyfing the flour in a conventional manner in the presence of water, thereby obtaining a mash;

c) substantially precipitating the proteins present in the mash by cooling, sieving and drying, thereby obtaining the proteins and a substrate;

d) fermenting and distilling the substrate in a conventional manner, thereby obtaining ethanol and pulp;

e) separating the pulp into a solid phase and a clear phase, wherein a clear phase with a content of solids of less than 1% is obtained; and

f) obtaining methane from the clear phase in a high-performance methane reactor.

12. Method according to any of the preceding claims, wherein a decanter or a disk centrifuge is used for separation of the solid phase and clear phase of the pulp.

13. Method according to any of the preceding claims, wherein about 80% of the liquid in the pulp is withdrawn with the clear phase.

14. Method according to any of the preceding claims, wherein the content of solids in the clear phase is less than 0,5%.

15. Method according to any of the preceding claims, wherein fermentation is carried out in a batch process, cascading process or in a continuous process comprising a recycling of yeast.

16. Method according to any of the preceding claims, wherein a high-performance methane reactor is employed.

17. Method for producing ethanol und methane from grain, comprising

a) milling the grain to a particle size of less than 1 mm, preferably less than 0,6 mm, and separating bran and hull components from the flour;

b) enzymatically liquefying and sacchariyfing the flour in a conventional manner in the presence of water, thereby obtaining a mash;

c) fermenting and distilling the substrate in a conventional manner, thereby obtaining ethanol and pulp;

d) agglomerating yeast, fibres, solid substances, fat and/or proteins present in the pulp by cooling and sedimenting them;

e) dividing the pulp into a solid phase and a clear phase, wherein a clear phase with a content of solids of less than 1% is obtained; and

f) obtaining methane from the clear phase in a high-performance methane reactor.

18. Method according to any of the preceding claims, wherein a high-performance methane reactor is employed, comprising beads with a diameter of 1 to 2 mm in which methane bacteria are immobilised.

19. Method according to claim 18, wherein the immobilisation of the methane bacteria in the beads increases the space time yield in the reactor and preferably allows a space time yield of at least 25 kg CSB/(m^3*d).

20. Method according to any of the preceding claims, wherein the methane production in a high-performance methane reactor comprises a pre-acidification / conditioning.

21. Method according to any of the preceding claims, wherein the high-performance methane reactor comprises an Upflow anaerobic sludge blanket (UASB)-reactor.

22. Method according to any of the preceding claims, wherein the high-performance methane reactor comprises an Internal Circulation (IC)-reactor.

23. Method according to any of the preceding claims, wherein the crude ethanol is rectified and, if necessary, dehydrated, in order to obtain bioethanol or neutral ethanol.

24. Method according to any of the preceding claims, wherein more than 100 m^3 Ethanol / day are produced.

25. Method according to any of the preceding claims, wherein more than 300 m^3 Ethanol / day are produced.

26. Method according to any of the preceding claims, wherein the clear phase of the pulp is aerobically purified after anaerobic purification in the methane reactor.

27. Method according to claim 26, wherein the anaerobically/ aerobically purified clear phase is added to the conversion process as water for dilution.

28. Method according to any of claims 26 and 27, wherein anaerobically/aerobically purified clear phase is employed for the addition of water for liquefaction of the flour.

29. Method according to any of the preceding claims, wherein the solid phase of the pulp is mixed with separated hull components and/or bran.

30. Method according to any of the preceding claims, wherein the solid phase of the pulp is mixed with separated proteins.

31. Method according to claims 29 or 30, wherein the mixture is further dried.

32. Method for producing a feeding stuff and/or fertilizer comprising a method according to claims 29 to 31.

33. Method for producing energy and/or heat, comprising a method for producing ethanol and methane according to any of claims 1 to 32 and converting the methane to energy and/or heat.

34. Method according to claim 33, wherein the solid phase of the pulp is dried and burned for the generation of energy.

35. Method for producing energy and/or heat, comprising a method for producing ethanol and methane from grain, comprising

a) milling the grain to a particle size of less than 0,6 mm and separating bran and hull components from the flour;

b) enzymatically liquefying and sacchariyfing the flour in a conventional manner in the presence of water, thereby obtaining a mash;

c) fermenting and distilling the substrate in a conventional manner thereby obtaining ethanol and pulp;

d) agglomerating yeast, fibers, solid substances, fat and/or proteins by cooling and sedimenting them;

e) dividing the pulp into a solid phase and a clear phase, wherein a clear phase with a content of solids of less than 1% is obtained; and

f) obtaining methane from the clear phase in a high-performance methane reactor and drying and burning the solid phase of the pulp for the generation of energy.

36. Use of the clear phase of pulp from the production of bioethanol with a content of solids of less than 1 % (w/v) for producing methane, energy and heat.

37. Use according to claim 36, wherein a high-performance methane reactor is employed for production of methane, comprising beads with a diameter of 1 to 2 mm in which methane bacteria are immobilised.

38. Use according to any of claims 36 and 37, wherein the immobilisation of the methane bacteria in the beads increases the space time yield in the reactor and preferably allows a space time yield of at least 25 kg CSB/(m^3*d).

39. Use according to any of claims 36 to 38, wherein the method of preparing methane in a high-performance methane reactor comprises a pre-acidification / conditioning.

40. Use according to any of claims 36 to 39, wherein the high-performance methane reactor comprises an Upflow anaerobic sludge blanket (UASB) reactor.

41. Use according to any of claims 36 to 40, wherein the high-performance methane reactor comprises an Internal Circulation (IC) reactor.

42. Production plant for producing ethanol and methane from a biomass in accordance with any of claims 1 to 35 comprising a means for fermentation, distillation, and a high-performance methane reactor.

43. Ethanol, methane and/or energy obtainable according to any of claims 1 to 35.